



Georgia Basin-Puget Sound Ecosystem Indicators Report

Technical Backgrounders

Species At Risk

Spring 2002

**Transboundary Georgia Basin-Puget Sound
Working Group on Environmental Indicators**

Georgia Basin Ecosystem Initiative, Environment Canada
BC Ministry of Water, Land and Air Protection
Puget Sound Water Quality Action Team
Washington State Department of Ecology
US Environmental Protection Agency

Species at Risk in the Georgia Basin

Primary Indicator: *Percent of known indigenous species in the Georgia Basin that are threatened or endangered.*

Selection and Use of Indicator

The percent of known indigenous species in the Georgia Basin that are threatened or endangered is a *state* indicator, providing a direct measure of biological diversity. It is widely used as an environmental indicator by international organizations such as the Organization for Economic Cooperation and Development (OECD), International Union for Conservation of Nature and Natural Resources (IUCN), Environment Canada, and the United States Environmental Protection Agency (EPA). The Georgia Basin is the most highly human populated region in British Columbia and therefore pressures are greater on wildlife than in less populated regions of the province.

Data and Sources:

Table 1. Summary data of vascular plants and vertebrate species that are native to and breed in the Georgia Basin. Subspecies of native, breeding species are NOT included. Mammals include marine mammals. Note: The numbers of species are included in brackets.

Species Group	Percent of total, native breeding species in Georgia Basin that are Threatened or Endangered or Candidates for these Designations - Red-listed	Percent of total, native breeding species in Georgia Basin that are Vulnerable - Blue-listed	Total # of Native, Breeding Species in the Georgia Basin
Freshwater Fish	34% (14)	15% (6)	41
Amphibians	23% (3)	15% (2)	13
Reptiles	13% (1)	25% (2)	8
Birds	8% (13)	6% (10)	163
Mammals	14% (10)	12% (9)	72
Vascular Plants	5%(73)	6%(83)	1367
Total	6.5% (109)	7% (115)	1664

Source: B.C. Ministry of Environment, Lands and Parks 2000

The Association for Biodiversity Information, which includes a network of Conservation Data Centres across North America, use a standardized method for assessing the conservation status of species (developed over past 28 years). In Canada, the Committee for the Status of Endangered Wildlife in Canada (COSEWIC), assesses the national status of species at risk.

This indicator includes native species that breed in the Georgia Basin/Puget Sound region, and those considered at risk in the indicator are ranked in the two most critical conservation categories developed by the Association for Biodiversity. In BC this corresponds to threatened or endangered status, while in Puget Sound it corresponds to threatened or endangered and in some cases sensitive. The term *species at risk* is used here to refer collectively to species in these conservation categories. Species considered to be threatened or endangered or candidates for these designations are ranked by Conservation data centres as S1, S2 and sometimes S3.

There is one notable difference between the ranking assigned by the B.C. Conservation Data Centre and COSEWIC for Resident Killer Whales. Although the indicator uses the B.C. Conservation Data Centre ranking – Vulnerable for Killer Whales, it is worth noting that COSEWIC has ranked the Southern Resident Killer Whale population (a subset of the Resident Killer Whale eco-type) endangered.

Below are definitions of the Conservation Data Centre S1 , S2 and S3 rankings.

Relationship of Red and Blue Status to the BC Conservation Data Centre Ranks

Species/Communities are assigned to the RED or BLUE list on the basis of the provincial Conservation Status Rank (SRANK) assigned by the Conservation Data Centre and maintained in the BCD.

	Red List	Blue List
Animals	S1 S1S2 S2 S2? S1S3	S2S3 S2S4 S3 S3? S3S4
Plants	S1 S2	S1S3 S2S3 S3
Plant Communities	S1 S1S2 S2 S2?	S2S3 S3 S3?

British Columbia Conservation Data Centre S Rank Definitions

S1 = Critically Imperiled	Critically imperiled provincially because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).
S2 = Imperiled	Imperiled provincially because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).
S3 = Vulnerable	Vulnerable provincially either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations) , or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals
S4 = Apparently Secure	Uncommon but not rare, and usually widespread. Possibly cause for longterm concern. Typically more than 100 occurrences provincially or more than 10,000 individuals.
S5 = Secure	Common, typically widespread and abundant.
SX = Presumed Extirpated	Believed to be extirpated. Not located despite intensive searches and virtually no likelihood that it will be rediscovered.
SH = Possibly Extirpated	Known only from historical occurrences. Still some hope of rediscovery.

Definitions used in the analysis for this Indicator:

Species	A species, subspecies, variety or geographically defined population of wild flora or fauna.
Endangered	A species facing imminent extinction or extirpation from British Columbia.
Extinct	A species that no longer exists
Extirpated	A species that no longer exists in the wild in British Columbia, but occurs elsewhere.
Threatened	A species likely to become endangered if the limiting factors are not reversed.
Vulnerable	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Red-listed	A Red-listed species occurs on the <i>BC Provincial Vertebrate Animal Tracking List 2001</i> or the <i>BC Provincial Vascular Plant Tracking List 2001</i> and is considered to be Extirpated, Endangered, or Threatened in British Columbia (BC Conservation Data Centre 2000a,b). Red-listed taxa include those that have been, or are being, evaluated for those designations. Freshwater fish species include proposed changes dated December 13 1999 (BC Conservation Data Centre 1999).
Blue-listed	A Blue-listed species occurs on the <i>BC Provincial Vertebrate Animal Tracking List 2001</i> or the <i>BC Provincial Vascular Plant Tracking List 2001</i> and is considered to be Vulnerable in British Columbia (BC Conservation Data Centre 2000a,b). Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events.

Methodology and Reliability:

Identifying Vertebrate Species that occur in the Georgia Basin

A complete species list of mammals, amphibians, reptiles, and birds occurring in the Georgia Basin was compiled from a database adapted from Stevens (1995) listing all taxa by ecosection according to the ecological classification system (Demarchi 1993). By overlaying an electronic boundary map of the Georgia Basin on an electronic map of ecosections, using ArcExplorer GIS map viewing software, it was determined that 15 ecosections fell totally or partially within the Georgia Basin boundary. Seven ecosections (WIM, NIM, OUF, VIS, NPR, LPR, and STU) overlapped the boundary with the majority of the ecosection falling outside the Georgia Basin and these ecosections were discarded from the analysis. Ecosections where the majority of the area fell within the Georgia Basin boundary were retained for the analysis. These were LIM, NAL, SOG, FRL, GEL, SPR, EPR, and LPR.

The resulting lists of taxa in each of these 8 ecosections were then edited for breeding status in the Georgia Basin by specialists: Victoria Stevens (mammals, amphibians, and reptiles) and John Cooper (birds). Non-breeding and introduced taxa were discarded. The list of freshwater fish species in the Georgia Basin was prepared in consultation with Alex Peden and Gordon Haas and cross-referenced with *Rare Freshwater Fish of British Columbia* (Cannings and Ptolemy 1998). Common and scientific names are from *The Vertebrates of British Columbia: Scientific and English Names* (BC Ministry of Environment, Lands and Parks 1998).

Species at risk in the Georgia Basin:

The complete list of Georgia Basin vertebrate taxa was cross-referenced with the 2001 *Provincial Vertebrate Animal Tracking List* for status as Red-listed or Blue-listed (BC Conservation Data Centre 2001a,b; <http://www.elp.gov.bc.ca/rib/wis/cdc/index.htm>). All vertebrate in British Columbia have been classified by the Conservation Data Centre (2000c) using two designations for 'at risk': (1) threatened, endangered, extirpated or candidates for these designations (Red-listed), and (2) vulnerable (Blue-listed). Taxa that are considered to be secure in British Columbia are categorized as Yellow-listed. A full description of how species are categorized can be found in Harcombe et.al. (1994), and on the Conservation Data Centre website <http://www.elp.gov.bc.ca/rib/wis/cdc/list.htm>). The complete list of native vertebrate species and subspecies that breed in the Georgia Basin and their status is provided in Appendix A. The list of freshwater fish was reviewed by Gordon Haas (BC Ministry of Fisheries) and Syd Cannings reviewed the reptiles, amphibians, birds, and mammals (BC Conservation Data Centre).

Identifying Vascular plants that grow in the Georgia Basin

Marta Donovan of the BC Conservation Data Centre prepared a list of native vascular plants in the Georgia Basin and their status (red listed or blue listed). Ecosection distribution and threats to vascular plants are not available. The list of red and blue listed native vascular plants in the Georgia Basin is provided in Appendix B.

Species count

The species count for the primary indicator is carried out using the following methodology:

1. Subspecies are counted; if there is more than one subspecies for a species, then it is only counted once.
2. The subspecies that has the highest status (i.e.; red is higher than blue, blue is higher than yellow) is counted.
3. species populations are counted; if there is more than one population it is counted only once
4. These are populations in the Georgia Depression, and the population with the highest status (i.e.; red is higher than blue, blue is higher than yellow) is counted.

References:

British Columbia Conservation Data Centre. 2001a. 2001 Provincial vertebrate animal tracking list. BC Ministry of Environment Lands and Parks, Victoria, BC. Accessible by the <http://www.elp.gov.bc.ca/rib/wis/cdc/tracking.htm>

British Columbia Conservation Data Centre. 2001c. Provincial list status and CDC ranks. BC Ministry of Environment, Lands and Parks, Victoria, BC. Available by the Internet at: <http://www.elp.gov.bc.ca/rib/wis/cdc/list.htm>

Cannings, S. and J. Ptolemy. 1998. Rare freshwater fish of British Columbia. B.C. Ministry of Environment, Lands and Parks. Victoria, B.C.

Demarchi, D.A. 1993. Ecoregions of British Columbia, third ed. B.C. Ministry of Environment, Lands and Parks, Wildlife Branch. Victoria, B.C. Map.

Fraser, D, W.L. Harper, S.G. Cannings and J.M. Cooper. 1999. Rare birds of British Columbia. B.C. Ministry of Environment, Lands and Parks, Wildlife Branch and Resources Inventory Branch. Victoria, B.C.

Harcombe, A., B. Harper, S. Cannings, D. Fraser and W.T. Munro, 1994. "Terms of endangerment" in Harding, L.E. and E. McCullum, eds. *Biodiversity in British Columbia: Our Changing Environment*. Vancouver BC: Environment. Canada, Canadian Wildlife Service, Pacific and Yukon Region. p. 11-28.

Hass, G. 1998. Indigenous fish species potentially at risk in BC with recommendations and prioritizations for conservation forestry/resource use, inventory and research. BC Ministry of Fisheries, Fisheries Management Report No. 105.

Resources Inventory Committee. 1998. The vertebrates of British Columbia: scientific and english names. Version 2.0. BC Ministry of Environment, Lands and Parks, July 13, 1998. <http://www.elp.gov.bc.ca/rib/wis/spi/taxonomy/mammals.html>

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- Syd Cannings (Conservation Data Centre): ph: 250-387-6250; email: Syd.Cannings@gems9.gov.bc.ca

Supplementary information:

A number of red and blue-listed bird species occur in, but do not breed in the Georgia Basin. The region provides critical habitat during migration or as wintering grounds for many of these species. The following table lists the non-breeding species for which the Georgia Basin is important.

Table 2. Significance of the Georgia Basin to selected taxa that do not breed in the region.

Common Name	Scientific Name	Importance of Georgia Basin to taxa	Critical habitat areas
Endangered or threatened (Red-listed) non-breeding Georgia Basin taxa			
Western Grebe	<i>Aechmophorus occidentalis</i>	Wintering habitat	Baynes Sound, Satellite Channel, Boundary Bay, Strait of Georgia between Parksville and Comox, Nanoose Bay
American White Pelican	<i>Pelecanus erythrorhynchos</i>	Migration	
"Violet-green" Pelagic Cormorant	<i>Phalacrocorax pelagicus pelagicus</i>	Wintering habitat	Active Pass
Swainson's Hawk	<i>Buteo swainsoni</i>	Migration	
Prairie Falcon	<i>Falco mexicanus</i>	Wintering habitat/migration	
Upland Sandpiper	<i>Bartramia longicauda</i>	Migration	
Hudsonian Godwit	<i>Limosa haemastica</i>	Migration	
Forster's Tern	<i>Sterna forsteri</i>	Migration	
Common Murre	<i>Uria aalge</i>	Spring and fall feeding congregations	Adults with juveniles in Juan de Fuca Strait in mid-summer.
Vulnerable (Blue-listed) non-breeding Georgia Basin taxa			
Trumpeter Swan	<i>Cygnus buccinator</i>	Wintering habitat	Fraser River foreshore and adjacent farmlands, Puntledge River estuary and adjacent farmland, Nicomen Slough, Saanich Peninsula farmlands, Somass River estuary.

Common Name	Scientific Name	Importance of Georgia Basin to taxa	Critical habitat areas
Oldsquaw	<i>Clangula hyemalis</i>	Wintering habitat	Haro Strait, Southern Gulf Islands, Ganges Harbour, Parksville-Qualicum nearshore, Discovery Channel.
Surf Scoter	<i>Melanitta perspicillata</i>	Wintering habitat/migration	Southern Gulf Islands, Burrard Inlet, Ganges Harbour, Nanoose Harbour, Strait of Georgia nearshore.
Gyr Falcon	<i>Falco rusticolus</i>	Wintering habitat	
American Golden-Plover	<i>Pluvialis dominica</i>	Migration	
American Avocet	<i>Recurvirostra americana</i>	Migration: breed rarely	
Wandering Tattler	<i>Heteroscelus incanus</i>	Migration	
Long-billed Curlew	<i>Numenius americanus</i>	Migration	
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Migration	Fraser River foreshore.
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Migration	Juan de Fuca Strait, Strait of Georgia
California Gull	<i>Larus californicus</i>	Wintering habitat	
Ancient Murrelet	<i>Synthliboramphus antiquus</i>	Migration	Haro Strait, Oak Bay, Juan de Fuca Strait
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	Wintering	Juan de Fuca Strait
Lewis' Woodpecker	<i>Melanerpes lewis</i>	Migration: breeding populations extirpated from Georgia Basin	Almost never occur.

Fraser, D. et al. 1999. Rare birds of British Columbia. B.C. Ministry of Environment, Lands and Parks.

Secondary Measure: *Location of threatened or endangered vertebrate species in the Georgia Basin.*

Selection of the Indicator

Geographic distributions are important to consider when identifying species at risk. This indicator considers the location and distribution of threatened, endangered and vulnerable species (red and blue-listed) in relation to the eight terrestrial ecosections that make up the Georgia Basin, the most heavily human-populated region in the province. This analysis is not available for vascular plants at this time.

Data and Sources:

Table 3. Total number of threatened and endangered (Red-listed) and vulnerable (Blue-listed) taxa (i.e.; includes sub-species) occurring in each ecosection in the Georgia Basin.

Ecoprovince	Ecosection	Fresh-water Fish		Reptiles		Amphibians		Mammals		Birds		Ecosection Total for Taxa	
		Red	Blue	Red	Blue	Red	Blue	Red	Blue	Red	Blue	Red	Blue
Georgia Depression	Fraser Lowland	4	5	0	1	2	2	7	6	6	8	16	23
	Georgia Lowland	0	2	0	1	0	2	1	5	8	9	6	19
	Leeward Island Mountains	1	2	0	2	0	1	4	5	7	8	9	18
	Nanaimo Lowland	3	2	1	1	1	1	2	5	9	10	13	19
	Strait of Georgia	2	1	1	2	0	1	1	4	8	11	11	19
Coast and Mountains	Northwestern Cascade Ranges	1	3	0	0	2	2	1	4	3	3	6	12
	Eastern Pacific Ranges	1	3	0	1	2	2	1	7	4	7	6	20
	Southern Pacific Ranges	3	4	0	0	1	2	1	5	6	8	9	20
	Total # Taxa*	14	6	1	3	3	2	10	11	12	12		

Source: BC Ministry of Environment, Lands and Parks 2001; Conservation Data Centre, 2001.

The total number of taxa for each column cannot be derived by adding the numbers in each column because one taxa may be at risk in several ecosections.

Methodology and Reliability

Data for the indicator was collected using the methodology outlined in the primary indicator. The ecoregional classification system (Demarchi 1993) was used to delineate ecosection boundaries. **Only those ecosections where the majority of area falls within the Georgia Basin boundary are included.**

References:

Demarchi, D.A. 1993. Ecoregions of British Columbia. BC Ministry of Environment, Lands and Parks. Victoria BC: Map.

Stevens, V. 1995. Database for wildlife diversity in British Columbia: Distribution, and habitat use of amphibians, reptiles, birds, and mammals in biogeoclimatic zones: BC Ministry of Forests Research Program, Victoria, B.C. Note: Supplementary database by ecosection available from Victoria Stevens.

Table 4.. Ecoregion distribution of threatened and endangered (red-listed) and vulnerable (blue-listed) vertebrate taxa in the Georgia Basin.

COMMON NAME				GEORGIA DEPRESSION ECOSECTIONS					COAST & MOUNTAINS ECOSECTIONS		
	Status	Breed in BC but not in GB	Breed in GB	FRL Fraser Lowlands	GEL Georgia Lowlands	LIM Leeward Island Mountains	NAL Nanaimo Lowlands	SOG Strait of Georgia	NWC North-western Cascade Mountains	EPR Eastern Pacific Ranges	SPR Southern Pacific Ranges
Freshwater Fish											
Cultus Lake Sculpin	R		x						x		
Enos Lake Benthic Stickleback	R		x				x				
Enos Lake Limnetic Stickleback	R		x				x				
Green Sturgeon	R		x	x							x
Lake Lamprey	R		x			x					
Morrison Creek Lamprey	R		x				x				
Nooksack River Dace	R		x	x							
Paxton Lake Benthic Stickleback	R		x					x			
Paxton Lake Limnetic Stickleback	R		x					x			
Pygmy Longfin Smelt	R		x								x
Salish Sucker	R		x	x							
Vananda Benthic Stickleback	R		x					x			
Vananda Limnetic Stickleback	R		x					x			
White Sturgeon, Fraser River pop.	R		x	x						x	x
Brassy Minnow	B		x	x							
Bull Trout	B		x	x					x	x	x
Coastal Cutthroat Trout	B		x	x	x	x	x	x	x	x	x

Table 4.. Ecosection distribution of threatened and endangered (red-listed) and vulnerable (blue-listed) vertebrate taxa in the Georgia Basin.

COMMON NAME				GEORGIA DEPRESSION ECOSECTIONS					COAST & MOUNTAINS ECOSECTIONS		
	Status	Breed in BC but not in GB	Breed in GB	FRL Fraser Lowlands	GEL Georgia Lowlands	LIM Leeward Island Mountains	NAL Nanaimo Lowlands	SOG Strait of Georgia	NWC North-western Cascade Mountains	EPR Eastern Pacific Ranges	SPR Southern Pacific Ranges
Dolly Varden	B		x	x	x	x	x		x	x	x
Eulachon	B		x								x
Mountain Sucker	B		x	x							
Amphibians											
Northern Leopard Frog	R		x				x				
Oregon Spotted Frog	R		x	x					x	x	x
Pacific Giant Salamander	R		x	x					x	x	
Red-legged Frog	B		x	x	x	x	x	x	x	x	x
Tailed Frog, coastal population	B		x	x	x				x	x	x
Reptiles											
Sharptail Snake	R		x				x	x			
Leatherback	B		x			x		x			
Painted Turtle	B		x	x	x	x	x	x		x	
Birds											
Vesper Sparrow <i>affinis</i> subspecies	R		x				x				
Brandt's Cormorant	R		x		x	x		x			x
Burrowing Owl	R		x		x		x				
Double-crested Cormorant	R		x	x	x	x	x	x			x
Marbled Murrelet	R		x	x	x	x	x	x	x		x
Northern Goshawk <i>laingi</i> subspecies	R		x			x	x	x			
Peregrine Falcon, <i>anatum</i> subspecies	R		x	x	x	x	x	x		x	x
Purple Martin	R		x	x	x		x	x			
Sandhill Crane Georgia Depression population	R		x	x	x	x	x	x		x	

Table 4.. Ecosection distribution of threatened and endangered (red-listed) and vulnerable (blue-listed) vertebrate taxa in the Georgia Basin.

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Spotted Owl	R		x						x	x	x
Western Blue Bird Georgia Depression population	R										
Western Meadowlark Georgia Depression population	R		x	x	x	x	x	x	x	x	x
American Bittern	B		x	x	x		x	x		x	x
Band-tailed Pigeon	B		x	x	x	x	x	x	x	x	x
Barn Owl	B		x	x	x		x	x		x	x
Caspian Tern	B		x	x	x		x	x			x
Great Blue Heron	B		x	x	x	x	x	x	x	x	x
Green Heron	B		x	x	x	x	x	x		x	x
Northern Pygmy Owl <i>swarthi</i> subspecies	B		x			x	x	x			
Sandhill Crane	B		x	x	x	x	x	x		x	x
Short-eared Owl	B		x	x	x	x	x	x	x	x	x
Tufted Puffin	B		x		x			x			
Western Screech Owl, <i>saturatus</i> subspecies	B		x			x	x	x			
White-tailed Ptarmigan <i>saxatilis</i> subspecies	B		x			x					
Mammals											
"Coastal" Mountain Beaver	R		x	x							
"Vancouver Island" Water Shrew	R		x			x	x				
"Vancouver Island" Wolverine	R		x			x					
"Washington" Long-tailed Weasel	R		x	x							

Table 4.. Ecosection distribution of threatened and endangered (red-listed) and vulnerable (blue-listed) vertebrate taxa in the Georgia Basin.

COMMON NAME				GEORGIA DEPRESSION ECOSECTIONS					COAST & MOUNTAINS ECOSECTIONS		
	Status	Breed in BC but not in GB	Breed in GB	FRL Fraser Lowlands	GEL Georgia Lowlands	LIM Leeward Island Mountains	NAL Nanaimo Lowlands	SOG Strait of Georgia	NWC North-western Cascade Mountains	EPR Eastern Pacific Ranges	SPR Southern Pacific Ranges
"Washington" Snowshoe Hare	R		x	x							
"Washington" Southern Red-backed Vole	R		x	x							
Keen's Long-eared Myotis	R		x	x	x	x	x	x	x	x	x
Pacific Water Shrew	R		x	x							
Townsend's Mole	R		x	x							
Vancouver Island Marmot	R		x			x					
"Cascades" Mountain Beaver	B		x							x	
"Roosevelt" Elk	B		x			x	x				
"Vancouver Island" Ermine	B		x			x	x				
"Western " Wolverine	B		x	x	x			x	x	x	x
Cascade Golden-Mantled Ground Squirrel	B		x							x	
Fisher	B		x	x	x				x	x	x
Grizzly Bear	B		x		x				x	x	x
Harbour Porpoise	B		x	x	x	x	x	x			
Killer Whale* (southern resident population listed endangered by COSEWIC)	B		x	x	x	x	x	x			
Townsend's Big-eared Bat	B		x	x		x	x	x	x	x	x
Trowbridge's Shrew	B		x	x						x	x
Species that breed in BC but outside the Georgia Basin											

Table 4.. Ecosection distribution of threatened and endangered (red-listed) and vulnerable (blue-listed) vertebrate taxa in the Georgia Basin.

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Birds											
Lewis' Woodpecker Georgia Depression	R	x		x	x		x			x	
"Violet-green" Pelagic Cormorant	R	x						x			
American Avocet	R	x		x	x						
American White Pelican	R	x			x			x		x	
Common Murre	R	x		x	x	x	x	x			x
Forster's Tern	R	x						x			
Hudsonian Godwit	R	x		x	x		x				
Prairie Falcon	R	x					x			x	
Swainson's Hawk	R	x		x	x		x			x	x
Upland Sandpiper	R	x			x		x				
Western Grebe	R	x		x	x	x	x	x			x
American Golden-Plover	B	x		x	x	x	x	x			
Ancient Murrelet	B	x		x	x		x	x			x
California Gull	B	x		x	x	x	x	x	x	x	x
Cassin's Auklet	B	x			x		x	x			x
Gyr Falcon	B	x		x	x	x	x	x			x
Lewis' Woodpecker	B	x		x	x		x			x	
Long-billed Curlew	B	x		x	x		x	x		x	
Oldsquaw	B	x		x	x			x		x	x
Red-necked Phalarope	B	x		x	x	x	x	x		x	x
Short-billed Dowitcher	B	x		x	x	x	x	x		x	x
Surf Scoter	B	x		x	x	x	x	x		x	x

Table 4.. Ecosection distribution of threatened and endangered (red-listed) and vulnerable (blue-listed) vertebrate taxa in the Georgia Basin.

COMMON NAME				GEORGIA DEPRESSION ECOSECTIONS					COAST & MOUNTAINS ECOSECTIONS		
	Status	Breed in BC but not in GB	Breed in GB	FRL Fraser Lowlands	GEL Georgia Lowlands	LIM Leeward Island Mountains	NAL Nanaimo Lowlands	SOG Strait of Georgia	NWC North-western Cascade Mountains	EPR Eastern Pacific Ranges	SPR Southern Pacific Ranges
Trumpeter Swan	B	x		x	x	x	x	x		x	x
Wandering Tattler	B	x			x		x	x			
Mammals											
Steller sea lion	R	x		x	x	x	x	x			
Species that occur in BC but do not breed here											
Mammals											
Humpback whale	B			x	x	x	x	x			
Gray whale	B			x	x	x	x	x			
Le Conte Sparrow	B			x		x	x				

Table 7. Known threats to threatened or endangered (Red-listed) vertebrate taxa in the Georgia Basin.

Common Name	Urban Dev't	Agricult'l Dev't & Mng.	Logging	Human Disturb.	Livestock Grazing	Alien Species	Environ. Contam'n	Poaching & Accidental Mortality	Other	# of threats minor threats in brackets
FRESHWATER FISH										
Lake Lamprey			y				y			(2)
Morrison Creek Lamprey	X		X				X		X	4
White Sturgeon, Fraser River pop.	y	y					y	X	X	2 (3)
Green Sturgeon	X	X					X	X	X	5
Pygmy Longfin Smelt			X			y	y			1 (2)
Nooksack River Dace	X	X	y		X	X	X			5 (1)
Salish Sucker	X	X	y		X	X	X			5 (1)
Enos Lake Limnetic Stickleback	y	X	y			X	X			3 (2)
Enos Lake Benthic Stickleback	y	X	y			X	X			3 (2)
Paxton Lake Limnetic Stickleback	y		y			X	X			2 (2)
Paxton Lake Benthic Stickleback	y		y			X	X			2 (2)
Vananda Limnetic Stickleback	X	X				X	X			4
Vananda Benthic Stickleback	X	X				X	X			4
Cultus Lake Sculpin	X	y	X			y	y			2 (3)
AMPHIBIANS										
Pacific Giant Salamander			X							1

Table 7. Known threats to threatened or endangered (Red-listed) vertebrate taxa in the Georgia Basin.

Common Name	Urban Dev't	Agricult'l Dev't & Mng.	Logging	Human Disturb.	Livestock Grazing	Alien Species	Environ. Contam'n	Poaching & Accidental Mortality	Other	# of threats minor threats in brackets
Oregon Spotted Frog	X _w	X _w				X	y	y		3 (2)
Northern Leopard Frog	y _w	y _w			X	X	y	y		2 (4)
REPTILES										
Sharptail Snake	X	y	X			X				3 (1)
BIRDS										
Brandt's Cormorant				X			X	y		2 (1)
Double-crested Cormorant				X			X	y	y?	2 (2)
Northern Goshawk - laingi subspecies			X	X			y	y		2 (2)
Peregrine Falcon – anatum subspecies	X	X		X			X	y		4 (1)
Marbled Murrelet			X				X	X		3
Burrowing Owl	X	X		X	X			y	y	4 (2)
Spotted Owl			X							1
Purple Martin				X		X				2
Vesper Sparrow - affinis subspecies	X	X				X			X	4
Western Meadowlark	X	X								2
Western Bluebird	X					X				2
Lewis Woodpecker	X	X				X			X	4
MAMMALS										
Pacific Water Shrew	X	X	X			X	X			5
Water Shrew, brooksi subspecies	X	X	X							3

Table 7. Known threats to threatened or endangered (Red-listed) vertebrate taxa in the Georgia Basin.

Common Name	Urban Dev't	Agricult'l Dev't & Mng.	Logging	Human Disturb.	Livestock Grazing	Alien Species	Environ. Contam'n	Poaching & Accidental Mortality	Other	# of threats minor threats in brackets
Townsend's Mole	X	X		X				y		3 (1)
Keen's Long-eared Myotis	Y	y	X	X					X	3 (2)
Snowshoe Hare - washingtonii subspecies	X	X				X				3
Mountain Beaver, rufa subspecies			X						y	1 (1)
Southern Red-backed Vole -occidentalis ssp	X	X								2
Vancouver Island Marmot			X	y				y		1 (2)
Wolverine - vancouverensis subspecies			X	y						1 (1)
Long-tailed Weasel - altifrontalis subspecies	X	X	y		y			X		3 (1)
Total vertebrates affected by major threats (X)	21	19	14	8	4	17	15	4	7	
As a percentage of Red-listed Taxa (out of 40)	52	48	35	20	10	42	38	10	18	
Total Red-listed vertebrates affected by major and minor	28	24	22	10	5	18	22	13	9	
As a percentage of Red-listed Taxa in the Basin	70%	60%	55%	25%	12%	50%	55%	32%	25%	

Table 8. Known threats to vulnerable (Blue-listed) vertebrate taxa in the Georgia Basin.

Common Name	Urban Dev't	Agricult'l Dev't & Mng.	Logging	Human Disturb.	Livestock Grazing	Alien Species	Environ. Contam'n	Poaching & Accidental Mortality	Other	# of threats minor threats in brackets
FRESHWATER FISH										
Coastal Cutthroat Trout	X	X	X		X	X	X	X	X	9
Bull Trout	y	X	X		X	X	y	X	X	9
Dolly Varden	X	X	X		X	X	X	X	X	9
Eulachon	X	X	X				X		X	6
Brassy Minnow	X	X			y	X	y	y		3 (3)
Mountain Sucker	y	y	y		y	y	y			(7)
AMPHIBIANS										
Tailed Frog, coastal population			X				y			1 (1)
Red-legged Frog	X	X				X	X			4
REPTILES										
Painted Turtle	X _w	X _w			X		y	X		4 (1)
Rubber Boa	X		X		y					1 (1)
BIRDS										
American Bittern	X _w	X _w			y		y			2 (2)
Great Blue Heron	X _w	X _w	y	X			X			4 (1)
Green Heron	X _w			y			X		X	3 (1)

Table 8. Known threats to vulnerable (Blue-listed) vertebrate taxa in the Georgia Basin.

Common Name	Urban Dev't	Agricult'l Dev't & Mng.	Logging	Human Disturb.	Livestock Grazing	Alien Species	Environ. Contam'n	Poaching & Accidental Mortality	Other	# of threats minor threats in brackets
White-tailed Ptarmigan - saxatilis subspecies			y							(1)
Sandhill Crane		X _w	X?		X					3
Caspian Tern				X			y			1 (1)
Tufted Puffin				X		X	X	X	X	5
Barn Owl	X						y	y	X	1 (2)
Western Screech-Owl; saturatus subspecies	X	X	X							3
Pygmy-ow, swarthi subspecies			X							1
Short-eared Owl	X	X		X					X	4
Band-tailed Pigeon	X	X								2
Barn Owl	X	X								2
Caspian Tern						y	y			(2)
MAMMALS										
Trowbridge's Shrew	X	X				X				3
Townsend's Big-eared bat	X		X	X			y			3 (1)
Mountain Beaver - rainieri subspecies			X						y	1 (1)

Table 8. Known threats to vulnerable (Blue-listed) vertebrate taxa in the Georgia Basin.

Common Name	Urban Dev't	Agricult'l Dev't & Mng.	Logging	Human Disturb.	Livestock Grazing	Alien Species	Environ. Contam'n	Poaching & Accidental Mortality	Other	# of threats minor threats in brackets
Cascade Golden Manteled Ground Squirrel			y						y	(2)
Wolverine - luscus subspecies			X	y				y		1 (2)
Fisher			X					X		2
Ermine, anguinae subspecies	X	X	X					y		3 (1)
Grizzly Bear	X	X	X	X	y			X	y	5 (2)
Elk, roosevelti subspecies	X		X					X	y	3 (1)
Total Blue major (X) threats only	19	16	15	6	5	7	7	8	8	
as a percentage of Blue-listed - major threats only Taxa (out of 31)	61	52	48	19	16	23	23	26	26	
Total Blue listed vertebrates affected	21	17	20	6	10	9	17	12	12	
As a percentage of all Blue-listed Taxa in the Basin	68%	55%	65%	19%	32%	29%	55%	39%	39%	

Key: X major threat; y minor threat; X_w/y_w threat associated with wetlands.

Marine mammals not included.

Source: Amphibians, Reptiles, Birds, and Mammals: B.C. Ministry of Environment, Conservation Data Centre 1999/2000. Fish: Cannings and Ptolemy 1998; Haas 1998; Haas pers.comm. Syd Cannings pers. comm. 2001.

Methodology and Reliability

Threat data was provided for amphibians, reptiles, birds and mammals (excluding marine mammals) by the Conservation Data Centre. Threats for freshwater fish were from Cannings and Ptolemy (1998) and Haas (1998), and in consultation with Gordon Haas, BC Ministry of Fisheries.

Threat analysis was undertaken using the following definitions:

Agricultural Development

This includes any alteration of natural habitats associated with food production. Examples include farms, orchards, and alfalfa fields. Species flagged as Xw are particularly affected by the draining of wetlands.

Alien Species Introductions

This includes deliberate or inadvertent introductions by humans and natural range extensions from introductions elsewhere. Alien species are those that enter an ecosystem beyond their historic range. Examples include European starling, Norway rat, raccoons on the Queen Charlotte Islands, and game fish stocking of lakes.

Environmental Contamination

This includes any chemical introduced to the environment that affects species at risk. Examples include pesticides such as DDT, lead shot, and oil spills from tanker accidents, illegal dumping of bilges, and pipeline ruptures. Amphibians, raptorial birds, and colonial nesting seabirds are particularly sensitive to environmental contaminants.

Human Disturbance

This includes both deliberate and accidental disturbance of animals. Examples include the presence of humans that results in abandonment of bird nests and bat maternity roosts, and the deliberate killing of some species of snakes.

Livestock Grazing

This includes alteration of natural habitats associated with grazing by any domestic livestock species. Examples include cattle, sheep, and horses. Dairy cattle are not included.

Other

This includes: (i) alteration of natural habitats associated with those developments not considered to be urban or agricultural in nature (e.g.. industrial, recreational, hydroelectric dams), and (ii) alteration of fire dependent habitats due to the existence

of fire control. Examples include open-pit mines, ski resorts and forest encroachment upon grasslands. For freshwater fish, “other” includes overfishing and hydroelectric dams.

Poaching and Accidental Mortality

This includes illegal killing, pest control, mortality of prey species and incidental take in fish nets. Examples include pest control of moles and pocket gophers considered at risk, accidental trapping of furbearers at risk, and poaching of species such as caribou, bison, and bighorn sheep.

Species flagged with Xf are those seabirds accidentally killed in fish nets. Legal harvest has the potential to affect some species at risk, but is tightly controlled, and is not the reason species are considered at risk.

Logging

This includes alteration of natural habitats associated with any aspect of forestry. Examples include timber harvesting, silvicultural treatment, site preparation, vegetation management.

Urban Development

This includes any alteration of natural habitats associated with human habitation. Examples include subdivisions, shopping malls, townsites, and recreational facilities. Species flagged as Xw are particularly affected by the draining of wetlands.

References:

Cannings, S.G. and J. Ptolemy. 1998. Rare Freshwater Fish of British Columbia. B.C. Government of British Columbia, Resources Inventory Branch and Ministry of Fisheries.

Haas, G.R. 1998. Indigenous fish species potentially at risk in BC with recommendations and prioritizations for conservation forestry/resource use, inventory and research. Fisheries Management Report No.105. B.C. Ministry of Fisheries, Research and Development Section, University of British Columbia, Vancouver, B.C.

Supplementary Information:

Comparison with the rest of the BC and other provinces

Of all the native breeding vertebrate species (n=75) and vascular plants (n=241) in BC that are listed as threatened or endangered, almost half of the vertebrates (n=36) and almost one-third of the vascular plants (n=73) are found in the Georgia Basin. This comparison is made using the species at risk summary data in Environmental Trends in British Columbia 2000, Species at Risk Technical document which can be

found at <http://www.elp.gov.bc.ca/sppl/soerpt/10-1-species-at-risk.html>

BC as a whole has the highest number of species followed by Ontario. BC also has the second most number of species at risk in Canada, with Ontario ranking first and Prince Edward Island and Nunavut having the fewest (Canadian Endangered Species Conservation Council (CESCC). 2001.)

References:

Canadian Endangered Species Conservation Council (CESCC). 2001. Wild Species 2000. The General Status of Species in Canada, Ottawa: Minister of Public Works and Government Services Canada. 48pp.

APPENDICES

Appendix A– A complete listing of native vertebrate taxa that breed in the Georgia Basin.

TAXA	COMMON NAME	SCIENTIFIC NAME	STATUS
Freshwater Fish	River Lamprey	<i>Lampetra ayresi</i>	
	Lake Lamprey	<i>Lampetra macrostoma</i>	RED
	Western Brook Lamprey	<i>Lampetra richardsoni</i>	
	Morrison Creek Lamprey	<i>Lampetra richardsoni marifuga</i>	RED
	Pacific Lamprey	<i>Lampetra tridentata</i>	
	Green Sturgeon	<i>Acipenser medirostris</i>	RED
	White Sturgeon, Fraser River pop.	<i>Acipenser transmontanus</i> , population 4	RED
	Pink Salmon	<i>Oncorhynchus gorbuscha</i>	
	Chum Salmon	<i>Oncorhynchus keta</i>	
	Coho Salmon	<i>Oncorhynchus kisutch</i>	
	Sockeye Salmon/Kokanee	<i>Oncorhynchus nerka</i>	
	Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	
	Coastal Cutthroat Trout	<i>Oncorhynchus clarki clarki</i>	BLUE
	Rainbow Trout	<i>Oncorhynchus mykiss</i>	
	Bull Trout	<i>Salvelinus confluentus</i>	BLUE
	Dolly Varden	<i>Salvelinus malma</i>	BLUE
	Mountain Whitefish	<i>Prosopium williamsoni</i>	
	Surf Smelt	<i>Hypomesus pretiosus</i>	
	Longfin Smelt	<i>Spirinchus thaleichthys</i>	
	Pygmy Longfin Smelt	<i>Spirinchus</i> spp.	RED
	Eulachon	<i>Thaleichthys pacificus</i>	BLUE
	Peamouth	<i>Mylocheilus caurinus</i>	
	Northern Squawfish	<i>Ptychocheilus oregonensis</i>	
	Brassy Minnow	<i>Hypognathus hankinsoni</i>	BLUE
	Longnose Dace	<i>Rhinichthys cataractae</i>	
	Nooksack River Dace	<i>Rhinichthys</i> sp.	RED
	Leopard Dace	<i>Rhinichthys falcatus</i>	
	Redside Shiner	<i>Richardsonius balteatus</i>	
	Longnose Sucker	<i>Catostomus catostomus</i>	
	Salish Sucker	<i>Catostomus</i> sp.	RED
	Largescale Sucker	<i>Catostomus macrocheilus</i>	
	Mountain Sucker	<i>Catostomus platyrhynchus</i>	BLUE
	Threespine Stickleback	<i>Gasterosteus aculeatus</i>	
	Enos Lake Limnetic Stickleback	<i>Gasterosteus</i> sp.	RED
	Enos Lake Benthic Stickleback	<i>Gasterosteus</i> sp.	RED
	Paxton Lake Limnetic Stickleback	<i>Gasterosteus</i> sp.	RED
	Paxton Lake Benthic Stickleback	<i>Gasterosteus</i> sp.	RED
	Vananda Limnetic Stickleback	<i>Gasterosteus</i> sp.	RED

TAXA	COMMON NAME	SCIENTIFIC NAME	STATUS
	Vananda Benthic Stickleback	<i>Gasterosteus sp.</i>	RED
	Coastrange Sculpin	<i>Cottus aleuticus</i>	
	Prickly Sculpin	<i>Cottus asper</i>	
	Cultus Lake Sculpin	<i>Cottus sp.</i>	RED
Amphibians	Roughskin Newt	<i>Taricha granulosa</i>	
	Northwestern Salamander	<i>Ambystoma gracile</i>	
	Long-toed Salamander	<i>Ambystoma macrodactylum</i>	
	Clouded Salamander	<i>Aneides vagrans</i>	
	Pacific Giant Salamander	<i>Dicamptodon tenebrosus</i>	RED
	Ensatina	<i>Ensatina eschscholtzii</i>	
	Western Redback Salamander	<i>Plethodon vehiculum</i>	
	Tailed Frog, coastal population	<i>Ascaphus truei, coastal population</i>	BLUE
	Western Toad	<i>Bufo boreas</i>	
	Pacific Treefrog	<i>Hyla regilla</i>	
	Red-legged Frog	<i>Rana aurora</i>	BLUE
	Northern Leopard Frog	<i>Rana pipiens</i>	RED
	Oregon Spotted Frog	<i>Rana pretiosa</i>	RED
Reptiles	Leatherback	<i>Dermochelys coriacea</i>	BLUE
	Painted Turtle	<i>Chrysemys picta</i>	BLUE
	Northern Alligator Lizard	<i>Elgaria coerulea</i>	
	Rubber Boa	<i>Charina bottae</i>	
	Sharptail Snake	<i>Contia tenuis</i>	RED
	Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	
	Northwestern Garter Snake	<i>Thamnophis ordinoides</i>	
	Common Garter Snake	<i>Thamnophis sirtalis</i>	
Birds	Red-throated Loon	<i>Gavia stellata</i>	
	Common Loon	<i>Gavia immer</i>	
	Pied-billed Grebe	<i>Podilymbus podiceps</i>	
	Double-crested Cormorant	<i>Phalacrocorax auritus</i>	RED
	Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>	RED
	Pelagic Cormorant	<i>Phalacrocorax pelagicus</i>	
	American Bittern	<i>Botaurus lentiginosus</i>	BLUE
	Great Blue Heron	<i>Ardea herodias</i>	BLUE
	Green Heron	<i>Butorides virescens</i>	BLUE
	Canada Goose	<i>Branta canadensis</i>	
	Wood Duck	<i>Aix sponsa</i>	
	Green-winged Teal	<i>Anas crecca</i>	
	Mallard	<i>Anas platyrhynchos</i>	
	Northern Pintail	<i>Anas acuta</i>	
	Blue-winged Teal	<i>Anas discors</i>	
	Cinnamon Teal	<i>Anas cyanoptera</i>	
	Northern Shoveler	<i>Anas clypeata</i>	
	Gadwall	<i>Anas strepera</i>	
	American Wigeon	<i>Anas americana</i>	
	Harlequin Duck	<i>Histrionicus histrionicus</i>	
	Common Goldeneye	<i>Bucephala clangula</i>	
	Barrow's Goldeneye	<i>Bucephala islandica</i>	
	Bufflehead	<i>Bucephala albeola</i>	

TAXA	COMMON NAME	SCIENTIFIC NAME	STATUS
	Hooded Merganser	<i>Lophodytes cucullatus</i>	
	Common Merganser	<i>Mergus merganser</i>	
	Ruddy Duck	<i>Oxyura jamaicensis</i>	
	Turkey Vulture	<i>Cathartes aura</i>	
	Osprey	<i>Pandion haliaetus</i>	
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	
	Northern Harrier	<i>Circus cyaneus</i>	
	Sharp-shinned Hawk	<i>Accipiter striatus</i>	
	Cooper's Hawk	<i>Accipiter cooperii</i>	
	Northern Goshawk	<i>Accipiter gentilis</i>	
	"Queen Charlotte" Goshawk	<i>Accipiter gentilis laingi</i>	RED
	Red-tailed Hawk	<i>Buteo jamaicensis</i>	
	Golden Eagle	<i>Aquila chrysaetos</i>	
	American Kestrel	<i>Falco sparverius</i>	
	Merlin	<i>Falco columbarius</i>	
	Peregrine Falcon, anatum subspecies	<i>Falco peregrinus anatum</i>	RED
	Blue Grouse	<i>Dendragapus obscurus</i>	
	Rock Ptarmigan	<i>Lagopus mutus</i>	
	White-tailed Ptarmigan	<i>Lagopus leucurus</i>	
	"Vancouver Island" White-tailed Ptarmigan	<i>Lagopus leucurus saxatilis</i>	BLUE
	Ruffed Grouse	<i>Bonasa umbellus</i>	
	Virginia Rail	<i>Rallus limicola</i>	
	Sora	<i>Porzana carolina</i>	
	American Coot	<i>Fulica americana</i>	
	Sandhill Crane	<i>Grus canadensis</i>	BLUE
	Sandhill Crane Georgia Depression population	<i>Grus canadensis</i>	RED
	Killdeer	<i>Charadrius vociferus</i>	
	Black Oystercatcher	<i>Haematopus bachmani</i>	
	Spotted Sandpiper	<i>Actitis macularia</i>	
	Common Snipe	<i>Gallinago gallinago</i>	
	Wilson's Phalarope	<i>Phalaropus tricolor</i>	
	Mew Gull	<i>Larus canus</i>	
	Glaucous-winged Gull	<i>Larus glaucescens</i>	
	Caspian Tern	<i>Sterna caspia</i>	BLUE
	Black Tern	<i>Chlidonias niger</i>	
	Pigeon Guillemot	<i>Cephus columba</i>	
	Marbled Murrelet	<i>Brachyramphus marmoratus</i>	RED
	Rhinoceros Auklet	<i>Cerorhinca monocerata</i>	
	Tufted Puffin	<i>Fratercula cirrhata</i>	BLUE
	Band-tailed Pigeon	<i>Columba fasciata</i>	
	Mourning Dove	<i>Zenaida macroura</i>	
	Barn Owl	<i>Tyto alba</i>	BLUE
	Western Screech Owl, saturatus subspecies	<i>Otus kennicottii saturatus</i>	BLUE
	Western Screech Owl, kennicotti	<i>Otus kennicottii kennicottii</i>	

TAXA	COMMON NAME	SCIENTIFIC NAME	STATUS
	subspecies		
	Great Horned Owl	<i>Bubo virginianus</i>	
	Northern Pygmy-owl	<i>Glaucidium gnoma</i>	
	"Vancouver Island" Pygmy Owl	<i>Glaucidium gnoma swarthi</i>	BLUE
	Burrowing Owl	<i>Athene cunicularia</i>	RED
	Spotted Owl	<i>Strix occidentalis</i>	RED
	Barred Owl	<i>Strix varia</i>	
	Long-eared Owl	<i>Asio otus</i>	
	Short-eared Owl	<i>Asio flammeus</i>	BLUE
	Northern Saw-whet Owl	<i>Aegolius acadicus</i>	
	Common Nighthawk	<i>Chordeiles minor</i>	
	Black Swift	<i>Cypseloides niger</i>	
	Vaux's Swift	<i>Chaetura vauxi</i>	
	Anna's Hummingbird	<i>Calypte anna</i>	
	Rufous Hummingbird	<i>Selasphorus rufus</i>	
	Belted Kingfisher	<i>Ceryle alcyon</i>	
	Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	
	Downy Woodpecker	<i>Picoides pubescens</i>	
	Hairy Woodpecker	<i>Picoides villosus</i>	
	Northern Flicker	<i>Colaptes auratus</i>	
	Pileated Woodpecker	<i>Dryocopus pileatus</i>	
	Lewis's Woodpecker, Georgia depression population	<i>Melanerpes lewis</i>	RED
	Olive-sided Flycatcher	<i>Contopus cooperi</i>	
	Western Wood-pewee	<i>Contopus sordidulus</i>	
	Willow Flycatcher	<i>Empidonax traillii</i>	
	Hammond's Flycatcher	<i>Empidonax hammondii</i>	
	Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	
	Western Kingbird	<i>Tyrannus verticalis</i>	
	Eastern Kingbird	<i>Tyrannus tyrannus</i>	
	Horned Lark	<i>Eremophila alpestris</i>	
	Purple Martin	<i>Progne subis</i>	RED
	Tree Swallow	<i>Tachycineta bicolor</i>	
	Violet-green Swallow	<i>Tachycineta thalassina</i>	
	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	
	Bank Swallow	<i>Riparia riparia</i>	
	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	
	Barn Swallow	<i>Hirundo rustica</i>	
	Gray Jay	<i>Perisoreus canadensis</i>	
	Steller's Jay	<i>Cyanocitta stelleri</i>	
	American Crow	<i>Corvus brachyrhynchos</i>	
	Northwestern Crow	<i>Corvus caurinus</i>	
	Common Raven	<i>Corvus corax</i>	
	Black-capped Chickadee	<i>Poecile atricapillus</i>	
	Mountain Chickadee	<i>Poecile gambeli</i>	
	Chestnut-backed Chickadee	<i>Poecile rufescens</i>	
	Bushtit	<i>Psaltirparus minimus</i>	
	Red-breasted Nuthatch	<i>Sitta canadensis</i>	

TAXA	COMMON NAME	SCIENTIFIC NAME	STATUS
	Winter Wren	<i>Troglodytes troglodytes</i>	
	Marsh Wren	<i>Cistothorus palustris</i>	
	American Dipper	<i>Cinclus mexicanus</i>	
	Golden-crowned Kinglet	<i>Regulus satrapa</i>	
	Ruby-crowned Kinglet	<i>Regulus calendula</i>	
	Western Bluebird	<i>Sialia mexicana</i>	
	Mountain Bluebird	<i>Sialia currucoides</i>	
	Townsend's Solitaire	<i>Myadestes townsendi</i>	
	Swainson's Thrush	<i>Catharus ustulatus</i>	
	Hermit Thrush	<i>Catharus guttatus</i>	
	American Robin	<i>Turdus migratorius</i>	
	Varied Thrush	<i>Ixoreus naevius</i>	
	Gray Catbird	<i>Dumetella carolinensis</i>	
	Cedar Waxwing	<i>Bombycilla cedrorum</i>	
	Cassin's Vireo	<i>Vireo cassinii</i>	
	Hutton's Vireo	<i>Vireo huttoni</i>	
	Warbling Vireo	<i>Vireo gilvus</i>	
	Red-eyed Vireo	<i>Vireo olivaceus</i>	
	Orange-crowned Warbler	<i>Vermivora celata</i>	
	Nashville Warbler	<i>Vermivora ruficapilla</i>	
	Yellow Warbler	<i>Dendroica petechia</i>	
	Yellow-rumped Warbler	<i>Dendroica coronata</i>	
	Townsend's Warbler	<i>Dendroica townsendi</i>	
	MacGillivray's Warbler	<i>Oporornis tolmiei</i>	
	Common Yellowthroat	<i>Geothlypis trichas</i>	
	Wilson's Warbler	<i>Wilsonia pusilla</i>	
	Western Tanager	<i>Piranga ludoviciana</i>	
	Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	
	Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	
	Spotted Towhee	<i>Pipilo maculatus</i>	
	Chipping Sparrow	<i>Spizella passerina</i>	
	"Oregon" Vesper Sparrow	<i>Poocetes gramineus affinis</i>	RED
	Savannah Sparrow	<i>Passerculus sandwichensis</i>	
	Fox Sparrow	<i>Passerella iliaca</i>	
	Song Sparrow	<i>Melospiza melodia</i>	
	Lincoln's Sparrow	<i>Melospiza lincolnii</i>	
	Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	
	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	
	Dark-eyed Junco	<i>Junco hyemalis</i>	
	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	
	Western Meadowlark	<i>Sturnella neglecta</i>	
	Western Meadowlark , Georgia Depression population	<i>Sturnella neglecta</i>	RED
	Western Bluebird, Georgia Depression population	<i>Sialia mexicana</i>	RED
	Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	
	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	
	Brown-headed Cowbird	<i>Molothrus ater</i>	
	Bullock's Oriole	<i>Icterus bullockii</i>	

TAXA	COMMON NAME	SCIENTIFIC NAME	STATUS
	Purple Finch	<i>Carpodacus purpureus</i>	
	House Finch	<i>Carpodacus mexicanus</i>	
	Red Crossbill	<i>Loxia curvirostra</i>	
	White-winged Crossbill	<i>Loxia leucoptera</i>	
	Pine Siskin	<i>Carduelis pinus</i>	
	American Goldfinch	<i>Carduelis tristis</i>	
	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	
Mammals	Pacific Water Shrew	<i>Sorex bendirii</i>	RED
	Common Shrew	<i>Sorex cinereus</i>	
	Dusky Shrew	<i>Sorex monticolus</i>	
	Water Shrew	<i>Sorex palustris</i>	
	"Vancouver Island" Water Shrew	<i>Sorex palustris brooksi</i>	RED
	Trowbridge's Shrew	<i>Sorex trowbridgii</i>	BLUE
	Vagrant Shrew	<i>Sorex vagrans</i>	
	Shrew-mole	<i>Neurotrichus gibbsii</i>	
	Coast Mole	<i>Scapanus orarius</i>	
	Townsend's Mole	<i>Scapanus townsendii</i>	RED
	Big Brown Bat	<i>Eptesicus fuscus</i>	
	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	
	Hoary Bat	<i>Lasiurus cinereus</i>	
	California Myotis	<i>Myotis californicus</i>	
	Western long-eared Myotis	<i>Myotis evotis</i>	
	Keen's Long-eared Myotis	<i>Myotis keenii</i>	RED
	Little Brown Myotis	<i>Myotis lucifugus</i>	
	Long-legged Myotis	<i>Myotis volans</i>	
	Yuma Myotis	<i>Myotis yumanensis</i>	
	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	BLUE
	Snowshoe Hare	<i>Lepus americanus</i>	
	"Washington" Snowshoe Hare	<i>Lepus americanus washingtonii</i>	RED
	Common Pika	<i>Ochotona princeps</i>	
	"Coastal" Mountain Beaver	<i>Aplodontia rufa rufa</i>	RED
	"Cascades" Mountain Beaver	<i>Aplodontia rufa rainieri</i>	BLUE
	Southern Red-backed Vole	<i>Clethrionomys gapperi</i>	
	"Washington" Southern Red-backed Vole	<i>Clethrionomys gapperi occidentalis</i>	RED
	Long-tailed Vole	<i>Microtus longicaudus</i>	
	Creeping Vole	<i>Microtus oregoni</i>	
	Meadow Vole	<i>Microtus pennsylvanicus</i>	
	Water Vole	<i>Microtus richardsoni</i>	
	Townsend's Vole	<i>Microtus townsendii</i>	
	Muskrat	<i>Ondatra zibethicus</i>	
	Heather Vole	<i>Phenacomys intermedius</i>	
	Northern Bog Lemming	<i>Synaptomys borealis</i>	
	Beaver	<i>Castor canadensis</i>	
	Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	
	Deer Mouse	<i>Peromyscus maniculatus</i>	
	Keen's Mouse, oreas subspecies	<i>Peromyscus keeni oreas</i>	
	Porcupine	<i>Erethizon dorsatum</i>	
	Vancouver Island Marmot	<i>Marmota vancouverensis</i>	RED

TAXA	COMMON NAME	SCIENTIFIC NAME	STATUS
	Cascade Golden-Mantled Ground Squirrel	<i>Spermophilus saturatus</i>	BLUE
	Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	
	Hoary Marmot	<i>Marmota caligata</i>	
	Yellow-bellied Marmot	<i>Marmota flaviventris</i>	
	Yellow-pine Chipmunk	<i>Tamias amoenus</i>	
	Townsend's Chipmunk	<i>Tamias townsendii</i>	
	Douglas Squirrel	<i>Tamiasciurus douglasii</i>	
	Pacific Jumping Mouse	<i>Zapus trinotatus</i>	
	Western Jumping Mouse	<i>Zapus princeps</i>	
	Coyote	<i>Canis latrans</i>	
	Red Fox	<i>Vulpes vulpes</i>	
	Gray Wolf	<i>Canis lupus</i>	
	Cougar	<i>Puma concolor</i>	
	Lynx	<i>Lynx canadensis</i>	
	Bobcat	<i>Lynx rufus</i>	
	"Vancouver Island" Wolverine	<i>Gulo gulo vancouverensis</i>	RED
	"Western " Wolverine	<i>Gulo gulo luscus</i>	BLUE
	River Otter	<i>Lontra canadensis</i>	
	Marten	<i>Martes americana</i>	
	Fisher	<i>Martes pennanti</i>	BLUE
	Ermine	<i>Mustela erminea</i>	
	"Vancouver Island" Ermine	<i>Mustela erminea anguinae</i>	BLUE
	Long-tailed Weasel	<i>Mustela frenata</i>	
	"Washington" Long-tailed Weasel	<i>Mustela frenata altifrontalis</i>	RED
	Mink	<i>Mustela vison</i>	
	Spotted Skunk	<i>Spilogale putorius</i>	
	Striped Skunk	<i>Mephitis mephitis</i>	
	Harbour Seal	<i>Phoca vitulina</i>	
	Raccoon	<i>Procyon lotor</i>	
	Black Bear	<i>Ursus americanus</i>	
	Grizzly Bear	<i>Ursus arctos</i>	BLUE
	Minke Whale	<i>Balaenoptera acutorostrata</i>	
	Killer Whale*	<i>Orcinus orca</i>	BLUE
	Harbour Porpoise	<i>Phocoena phocoena</i>	BLUE
	Dall's Porpoise	<i>Phocoenoides dalli</i>	
	Mountain Goat	<i>Oreamnos americanus</i>	
	"Roosevelt" Elk	<i>Cervus elaphus roosevelti</i>	BLUE
	Moose	<i>Alces alces</i>	
	"Black-tailed" Deer	<i>Odocoileus hemionus columbianus</i>	
	"Mule" Deer	<i>Odocoileus hemionus hemionus</i>	

*Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has listed the Southern Resident Killer Whale population as endangered. This population resides in the Puget Sound, Georgia Basin Transboundary area.

Appendix B– Red and Blue listed native vascular plants of the Georgia Basin.

Note: The complete list of 1367 native vascular plants that grow in the Georgia Basin is too large a table to list here but is available as an excel file from the State of Environment Reporting office.

Native Plants_Scientific Name	Status
Allium Crenulatum	Red
Allium Geyeri Var Tenerum	Red
Alopecurus Carolinianus	Red
Aster Curtus	Red
Aster Radulinus	Red
Balsamorhiza Deltoidea	Red
Camissonia Contorta	Red
Cardamine Parviflora Var Arenicola	Red
Carex Interrupta	Red
Castilleja Ambigua	Red
Castilleja Levisecta	Red
Castilleja Tenuis	Red
Centaurium Muehlenbergii	Red
Cephalanthera Austiniae	Red
Cimicifuga Elata	Red
Corydalis Scouleri	Red
Crassula Connata Var Connata	Red
Cyperus Squarrosus	Red
Dryopteris Marginalis	Red
Epilobium Densiflorum	Red
Epilobium Torreyi	Red
Erigeron Salishii	Red
Euonymus Occidentalis Var Occidentalis	Red
Helianthus Nuttallii Var Nuttallii	Red
Hutchinsia Procumbens	Red
Idahoia Scapigera	Red
Juncus Kelloggii	Red
Leymus Triticoides	Red
Lindernia Dubia Var Anagallidea	Red
Lomatium Grayi	Red
Lotus Formosissimus	Red
Lotus Pinnatus	Red
Lupinus Argenteus Var Laxiflorus	Red
Lupinus Densiflorus Var Densiflorus	Red
Lupinus Lepidus	Red
Lupinus Oreganus Var Kincaidii	Red
Lupinus Rivularis	Red
Meconella Oregana	Red
Microseris Bigelovii	Red

Native Plants_Scientific Name	Status
Microseris Lindleyi	Red
Mimulus Dentatus	Red
Minuartia Pusilla	Red
Myriophyllum Pinnatum	Red
Navarretia Intertexta	Red
Ophioglossum Pusillum	Red
Orobanche Pinorum	Red
Orthocarpus Bracteosus	Red
Orthocarpus Imbricatus	Red
Plagiobothrys Figuratus	Red
Plagiobothrys Tenellus	Red
Pleuricospora Fimbriolata	Red
Polystichum Californicum	Red
Psilocarphus Elatior	Red
Psilocarphus Tenellus Var Tenellus	Red
Ranunculus Alismifolius Var Alismifolius	Red
Ranunculus Californicus	Red
Ranunculus Lobbii	Red
Rubus Nivalis	Red
Salix Lemmonii	Red
Sanicula Arctopoides	Red
Sanicula Bipinnatifida	Red
Silene Scouleri Ssp Grandis	Red
Thelypteris Nevadensis	Red
Trifolium Cyathiferum	Red
Triglochin Concinnum Var Concinnum	Red
Triphysaria Versicolor Ssp Versicolor	Red
Triteleia Howellii	Red
Verbena Hastata Var Scabra	Red
Veronica Catenata	Red
Viola Praemorsa Ssp Praemorsa	Red
Wolffia Borealis	Red
Wolffia Columbiana	Red
Yabea Microcarpa	Red
Agrostis Pallens	Blue
Anagallis Minima	Blue
Anemone Drummondii Var Drummondii	Blue
Arabis Lignifera	Blue
Aster Paucicapitatus	Blue
Bidens Amplissima	Blue
Botrychium Ascendens	Blue
Botrychium Simplex	Blue
Callitriche Heterophylla Ssp Heterophylla	Blue
Callitriche Marginata	Blue
Caltha Palustris Var Palustris	Blue

Native Plants_Scientific Name	Status
Cardamine Angulata	Blue
Carex Amplifolia	Blue
Carex Comosa	Blue
Carex Feta	Blue
Carex Scoparia	Blue
Carex Vulpinoidea	Blue
Castilleja Rupicola	Blue
Cheilanthes Gracillima	Blue
Cicuta Maculata Var Maculata	Blue
Cryptogramma Cascadensis	Blue
Cuscuta Pentagona	Blue
Dicentra Uniflora	Blue
Douglasia Laevigata Var Ciliolata	Blue
Draba Lonchocarpa Var Vestita	Blue
Dryopteris Arguta	Blue
Elatine Rubella	Blue
Eleocharis Parvula	Blue
Eleocharis Rostellata	Blue
Elmera Racemosa Var Racemosa	Blue
Elodea Nuttallii	Blue
Epilobium Ciliatum Ssp Watsonii	Blue
Epilobium Glaberrimum Ssp Fastigiatum	Blue
Epilobium Leptocarpum	Blue
Erysimum Arenicola Var Torulosum	Blue
Erythronium Montanum	Blue
Galium Mexicanum Ssp Asperulum	Blue
Gentianella Tenella Ssp Tenella	Blue
Githopsis Specularioides	Blue
Glyceria Leptostachya	Blue
Glyceria Occidentalis	Blue
Hedysarum Occidentale	Blue
Helenium Autumnale Var Grandiflorum	Blue
Hydrophyllum Tenuipes	Blue
Hypericum Majus	Blue
Hypericum Scouleri Ssp Nortoniae	Blue
Jaumea Carnosa	Blue
Juncus Oxymeris	Blue
Leersia Oryzoides	Blue
Lewisia Triphylla	Blue
Lilaea Scilloides	Blue
Limnanthus Macounii	Blue
Lotus Unifoliolatus Var Unifoliolatus	Blue
Malaxis Brachypoda	Blue
Marah Oreganus	Blue
Melica Smithii	Blue

Native Plants_Scientific Name	Status
Mimulus Breweri	Blue
Mitella Caulescens	Blue
Montia Howellii	Blue
Myriophyllum Quitense	Blue
Myriophyllum Ussuriense	Blue
Nothochelone Nemorosa	Blue
Pellaea Gastonyi	Blue
Polygonum Hydropiperoides	Blue
Polygonum Punctatum	Blue
Potamogeton Oakesianus	Blue
Prosartes Smithii	Blue
Pyrola Elliptica	Blue
Romanzoffia Tracyi	Blue
Rubus Lasiococcus	Blue
Rupertia Physodes	Blue
Sagina Decumbens Ssp Occidentalis	Blue
Salix Sessilifolia	Blue
Sanguisorba Menziesii	Blue
Scrophularia Lanceolata	Blue
Smelowskia Ovalis	Blue
Spergularia Macrotheca Var Macrotheca	Blue
Stellaria Obtusa	Blue
Tonella Tenella	Blue
Toxicodendron Diversilobum	Blue
Trifolium Dichotomum	Blue
Viola Howellii	Blue
Viola Purpurea Var Venosa	Blue

Species at Risk in the Greater Puget Sound Basin

I. Indicator Description

Species of Concern in Washington State include those species listed as State Endangered, State Threatened, or State Candidate Species as well as species listed or proposed for listing by the US Fish and Wildlife Service or the National Marine Fisheries Service. The Species of Concern list is compiled from resident, breeding species historically native to Washington.

The following four criteria are used to evaluate species for inclusion on the Species of Concern list for Washington State:

- Evidence of decline of resident or breeding population, or contraction of the breeding range of the species within Washington State;
- Small size or limited distribution of breeding populations;
- Habitat specificity or low habitat versatility, with limited availability or high vulnerability of this habitat to alteration;
- Intolerance to disturbance during critical phases of a species life cycle.

The indicator is expressed as: the number of at risk species as a percentage of total number of species in the basin, reported by major taxonomic group; and the total number of species at risk reported by level 4 ecoregion.

II. Key Definitions

State Endangered Species are defined to include any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

State Threatened Species are defined as any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future without cooperative management or removal of threats.

State Candidate Species are defined as species whose status meet sufficient level of evidence to suggest that it may meet the listing criteria defined for endangered, threatened, or sensitive species.

State Sensitive Species are defined as any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become threatened or endangered throughout a significant portion of its range within the state without cooperative management or removal of threats.

III. Core Data

Both total numbers of vertebrate species and numbers of at risk species were identified within the Puget Sound Basin. Species meeting the '*of concern*' criteria were identified through the following data sources:

Washington State Department of Wildlife provided data resulting from a query to list species occurring in the Puget Sound Basin and considered to be at risk. Data reflect only core species occurring within the terrestrial habitats within the Puget Sound Basin. '*Monitored species*' species were excluded from the resulting species list, leaving endangered, threatened, and candidate species. The GAP data set is limited to terrestrial and vertebrates and did not address the freshwater or marine ecosystem.

The marine ecosystem of the greater Puget Sound basin was defined as it extends through the Northwest Straits and San Juan Islands to the international border and to the western end of the Strait of Juan de Fuca.

For resident and breeding marine birds and marine mammal species, at risk species were identified from the Species of Concern List maintained by the Washington State Department of Fish and Wildlife (WDFW, 2001). Non breeding winter resident species were excluded from the species tally. This excluded group of species includes both marine birds such as the western grebe, American white pelican, and brown pelican, and also marine mammals including the Fin, Sei, and Gray whales, and the Stellar sea lion. Data on more localized distributions of marine birds and mammals was provided through a series of NOAA marine habitat atlases (circa 1990), Kruckeberg (1991), and the Audobon Society (1977).

Data for marine and anadromous fish was provided through the Species of Concern general animal lists (WDFW, 2001), by Wydoski (1979), and by Kruckeberg (1991).

Data on plant species was provided through the Washington State Natural Heritage Program web-site (June, 2001).

Resulting numbers of species were summed for both level 4 ecoregion units and for the Greater Puget Basin as a whole. Ecoregions are designed to provide a spatial reference framework for environmental resource management and are based on physiographic metrics including climate, elevation, soils, and vegetation. Ecoregions denote areas within which ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. Assessing species at risk by ecoregion helps to identify the status and relative health of various ecosystems.

IV. References

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V. Tables and Data Summaries

Table 1.
Number Species of Concern
by Major Taxa within the Puget Sound Basin

Major Taxa	Number of Species of Concern (and estimated total number of native species)	Species of Concern as Percentage of Total Native Species in the basin
<i>Amphibians</i>	3 (20)	15%
<i>Birds (note 1)</i>	20 (164)	12%
<i>Freshwater/ Anadromous Fish</i>	9 (49)	18%
<i>Marine Fish</i>	20 (n/a)	not available
<i>Mammals (notes 2&3)</i>	10 (86)	12%
<i>Reptiles</i>	2 (8)	25%
<i>Vascular Plants</i>	~ 220 (n/a)	not available

Table Notes:

1. Includes both terrestrial and marine bird species.
2. This figure for at risk mammals includes 3 marine and 7 terrestrial mammals.
3. The number of total mammal species in the basin includes 5 resident, breeding marine mammals

Table 2.
Species at Risk in the Puget Sound Basin by Major Taxa

<u>Major Taxa</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>State Status</u>	<u>Federal Status</u>	<u>Ecoregion Occurrence</u>
Amphibians					
	Cascade torrent salamander	Rhyacotriton cascadae	C		
	Larch mountain salamander	Plethodon larselli	S	SC	
	Van dyke's salamander	Plethodon vandykei	C	SC	
Birds					
	Bald eagle	Haliaeetus leucocephalus	T	T	Marine/Coastal Lowlands & Forests
	Black-backed woodpecker	Picoides arcticus	C		
	<i>Brown pelican*</i>	<i>Pelecanus occidentalis</i>	E	E	Marine /Northwest Straits
	Brandt's cormorant	Phalacrocorax penicillatus	C		Marine/PS
	Cassin's Auklet	Ptychoramphus aleuticus	C	SC	Marine/PS
	Common loon	Gavia immer	S		
	Common murre	Uria aalge	C		Marine
	Golden eagle	Aquila chrysaetos	C		
	Harlequin Duck	Histrionicus histrionicus		SC	
	Lewis' woodpecker	Melanerpes lewis	C		
	Marbled murrelet	Brachyramphus marmoratus	T	T	Marine, Lowland Forests
	Merlin	Falco columbarius	C		
	Northern goshawk	Accipiter gentilis	C	SC	
	Peregrine falcon	Falco peregrinus	E	SC	
	Pileated woodpecker	Dryocopus pileatus	C		
	Purple Martin	Progne subis	C		
	Spotted owl	Strix occidentalis		T	
	Snowy plover	Charadrius alexandrinus	E	T	Marine/NWS
	Tufted puffin	Fratercula cirrhata	C	SC	Marine/NWS & PS
	Vaux's swift	Chaetura vauxi	C		
	<i>Western Grebe *</i>	<i>Aechmophorus occidentalis</i>	C		Marine/ NWS & PS
	Yellow-billed cuckoo	Coccyzus americanus	C	C	

Butterflies (* not included in the vertebrate species counts)

Johnson's hairstreak	Mitoura johnsoni	C	
Mardon skipper	Polites mardon	E	C
Puget blue	Plebejus icarioides blackmorei	C	

Anadromous Fish

Chinook salmon (Puget Sound)	Oncorhynchus tshawytscha	C	T	Marine/ Freshwater
Chum salmon (Hood Canal)	Oncorhynchus keta	C	T	Marine/ Freshwater
Coho Salmon	Oncorhynchus kisutch			Marine/ Freshwater

Freshwater Fish

Bull trout	Salvelinus confluentus	C	T	
Olympic mudminnow	Novumbra hubbsi	S		Southern Puget Lowlands
Pygmy whitefish	Prosopium coulteri	S		
River lamprey	Lampetra ayresi	C	SC	
Westslope cutthroat trout	Oncorhynchus clarki lewisi	S	C	
Kokanee (Lake Sammamish)	Oncorhynchus nerka		extinct (?)	Freshwater, central Puget Lowlands

Marine Fish

Pacific herring (Cherry Point)	Clupea pallasii	C		Marine
Pacific herring (Discovery Bay)	Clupea pallasii	C		Marine
Pacific cod (S&C Puget Sound)	Gadus macrocephalus	C		Marine
Pacific hake (C. Puget Sound)	Merluccius productus	C		Marine
Walleye pollock (Puget Sound)	Theragra chalcogramma	C		Marine
Brown rockfish	Sebastes auriculatus	C		Marine
Copper rockfish	Sebastes caurinus	C		Marine
Greenstriped rockfish	Sebastes elongatus	C		Marine
Widow rockfish	Sebastes entomelas	C		Marine
Yellowtail rockfish	Sebastes flavidus	C		Marine
Quillback rockfish	Sebastes maliger	C		Marine
Black rockfish	Sebastes melanops	C		Marine
China rockfish	Sebastes nebulosus	C		Marine
Tiger rockfish	Sebastes nigrocinctus	C		Marine
Bocaccio rockfish	Sebastes paucispinis	C		Marine
Canary rockfish	Sebastes pinniger	C		Marine
Redstripe rockfish	Sebastes proriger	C		Marine

Yelloweye rockfish	Sebastes ruberrimus	C	Marine
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Mammals

Fisher	Martes pennanti	E	SC	
<i>Fin whale*</i>	<i>Baleonoptera physalus</i>	E	E	Marine/Northwest Straits
Gray wolf	Canis lupus	E	E	
<i>Gray whale*</i>	<i>Eschrichtius robustus</i>	S		Marine
Grizzly bear	Ursus arctos	E	T	
Lynx	Lynx canadensis	T	T	
Orca whale	Orcinus Orca	C	C	Marine
Pacific Harbor Porpoise	Phocoena phocoena	C		Marine/Northwest Straits
Sea otter	Enhydra lutris	E		Marine/Northwest Straits
<i>Steller sea lion</i> *	<i>Eumetopias jubatus</i>	T	T	Marine
<i>Sei whale*</i>	<i>Balaenoptera borealis</i>	E	E	Marine/Northwest Straits
Western gray squirrel	Sciurus griseus	T	SC	
Western pocket gopher	Thomomys mazama	C	C	
Wolverine	Gulo gulo	C	SC	

Reptiles

Sharptail Snake	Contia tenuis	C	
Western pond turtle	Clemmys marmorata	E	SC

Federal Status Codes

E = Endangered
T = Threatened
C = Candidate
SC = Species of Concern

State Status Codes

E = Endangered
T = Threatened
C = Candidate
S = Sensitive

* Italics indicate exclusion from tally because they are considered only as winter residents and non-breeders within the area.

Table 3.
Number of Species of Concern by Ecoregion
within the US portion of the Puget Sound Basin

Ecoregion Unit	Eco-region unit number	Total Number of Vertebrate Species of Concern (excluding marine & anadromous species)	Number of at-risk Amphibian species	Number of at-risk Bird species	Number of at-risk Fish species	Number of at-risk Mammal species	Number of at-risk Reptile species
Northern Coast Range	1	-					
- Coastal Uplands (partial ecoregion)	1b	0 species					
- Low Olympics	1c	9 species	1	5	1 Fresh 1 Anad.	1	
- Volcanics	1d	8 species	1	5		2	

Puget Lowlands	2	-					
- Fraser Lowland (<i>partial ecoregion</i>)	2a	11 species		6	1 Marine 2 Anad.	1	1
- E. Puget Riverine Lowlands	2b	17 species		10	2 Anad. 1 Fresh	3	1
- San Juan Islands	2c	17 species		13	Many marine species	3 Marine	1
- Olympic Rainshadow	2d	17 species		12	1 Marine 2 Fresh	2	
- E. Puget Uplands	2e	15 species		9	2 Fresh	3	1
- Central Puget Lowlands	2f	20 species	1	10	3 Anad. 2 Fresh	3	1
- Southern Prairies	2g	14 species		5	1 Fresh 2 Anad.	4	2

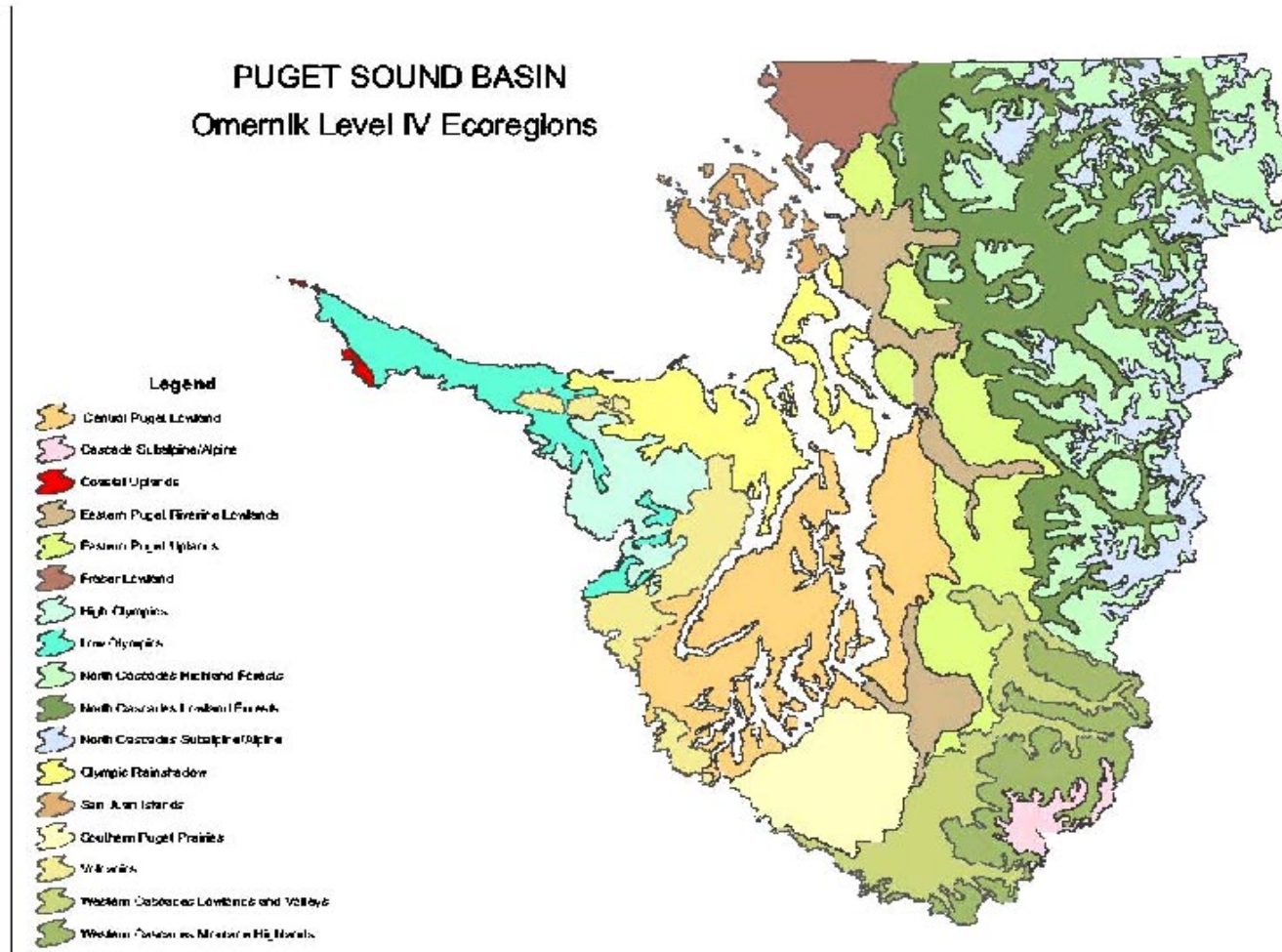
Cascades	4	-					
- W. Cascade Lowland Valleys	4a	16 species	1	7	2 Fresh 2 Anad.	4	
- W. Cascade Montane Highlands	4b	11 species	3	4		4	
- Cascade Sub-Alpine/ Alpine	4d	4 species		1		3	

Northern Cascades	77	-					
- N. Cascade Lowland Forest	77a	18 species		8	2 Anad. 4 Fresh	4	
- N. Cascades Highland Forests	77b	13 species		7		6	
- N. Cascade Sub-Alpine/ Alpine	77c	7 species		2		5	
- High Olympics	77l	4 species		2		2	
Marine Ecosystem	M	31 species		8	20 Marine	3 Marine	

Table Notes:

1. Species exist in more than eco-unit.

VI. Level 4 Ecoregions for the Puget Sound Basin



VII. Species at Risk by Level 4 Ecoregion

